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MEMOIR OF EDSON SEWELL BASTIN.

Death at best is a sad subject, but it becomes doubly so when, as was the case with Professor Bastin, the victim is cut down in the very zenith of his strength and usefulness. Beginning as a pioneer in what was then the far West, he naturally reached his full scientific development later than those who start surrounded with every educational facility, and who need to give no thought to the financial questions which usually attend the attainment of an education. But what he lost in time he gained in having a broader and more practical knowledge, which enabled him to more than make up in later years what he lost in early life.

The subject of this memoir was born May 29, 1843, in the southern part of Ozaukee County, Wis., on the southern shore of Lake Michigan, near what was then the village of Milwaukee. His parents, probably of remote French ancestry, had come there from northern New York some time previously. His father was a strong-resolute and daring man, with rather a restless temperament. His mother was sought for in that sparsely settled district by the neighbors in times of sickness; their ailments she relieved to the best of her knowledge and ability by the use of medicinal herbs, gathered and prepared by her own hands.

The boyhood of Professor Bastin was divided between farm work in summer and attendance at the district schools in winter. The family afterward moved to Wauwatsa, Wis., and then to Waukesha, in the same State.

The rugged life on a pioneer farm developed the latent energies of the boy, and he became self-reliant and fearless. He would engage in hunting in the depths of the forest, either day or night, and he was as successful in that important part of the pioneer's life as he was in the numerous other duties. His mother died when he was but twelve years of age, and his father was killed by accident some ten years later.

In 1859, while in his sixteenth year, he entered Carroll College, at Waukesha, Wis., and remained there until 1862, when the war spirit took possession of him, as it did of many others at that time. He entered the Twenty-eighth Wisconsin Infantry, which regiment became attached to the Army of the West, and engaged in the Arkansas campaign. This regiment experienced long, severe marches, much sickness and other privations, with the tedium unrelieved by the presence of the enemy until they reached Helena, Ark., where a battle was fought and won on July 4, 1863, and in the same year Little Rock was captured.

Soon after this, partly on account of illness, which unfitted him for field duty, and partly because of his clerical abilities, Professor Bastin was detached from his company and employed as a clerk at headquarters. After a year's service in this capacity, he was, in 1864, commissioned captain of the Fourth Arkansas Cavalry; this appointment was the result of a competitive examination. The young captain was, from this time to the end of the war, engaged actively in scouting and picket service, in which he won a high reputation for ability and bravery, and, through the voluntary recommendations of his superior officers, he was offered a cadetship at West Point. He, however, had no taste for military life in times of peace, and declined the honor. Instead of this, he entered Chicago University as a student, where he graduated in 1867.

Following this, he took a course of some three years in the same institution, in theology, which course he completed in 1870, with the degree of Bachelor of Divinity. His character at this time can best be understood by the following extract from an address at his funeral by one of his classmates, the Rev. Dr. John Gordon:

I became acquainted with Professor Bastin while in his senior year in the old University of Chicago, and was associated with him for four years in the class-rooms of the college and Theological Seminary. He first impressed me as being somewhat cold in manner, but on better acquaintance I found this

was simply his natural reserve, and that he possessed a warm and tender heart, which bestowed its affection more and more as the years went by.

As a student he was respected by professors and classmates because of his deportment, faithfulness and sincerity. He was always well prepared for recitation or examination, and never did things in a slip-shod manner. The testimony of his students in the Philadelphia College of Pharmacy to his exacting demands for honest work from them fittingly expresses his own early convictions and habits when a student.

Professor Bastin was a modest, unassuming young man, and never, until today, did I know that he had served in the army during the late civil war. His record as a soldier is one of which any man might justly be proud, and yet during all my four years' acquaintance with him I never heard him speak of the war.

We now come to a turning-point in the life of Professor Bastin, where, instead of following the ministry, for which his education had prepared him, he became interested in the natural sciences, particularly the science of botany. This subject had been studied by him in a variety of ways from his early youth, and the writer has heard him speak of the observations he made on the flora of Arkansas, while doing duty as a soldier there; consequently, "true as the needle to the pole," when in 1871 he was deciding on his life-work he came back to this same subject. He selected the drug business as a means to the end which he wished to accomplish, and for the next few years, while engaged in the duties of apothecary in Chicago, he gave much time to the study of botany and its allied sciences. In 1873 he married Christina Boyd, and shortly after disposed of his drug business. His reputation won in the civil war secured for him an appointment as United States Marshal, and he moved with his wife to the scene of his duty in Indian Territory. The experience in this lawless region was of the most thrilling character, and often exposed him to great danger, but his cool judgment, thorough horsemanship, as well as his ability to use firearms to the greatest advantage, brought him safely through every conflict. His wife, however, could not endure the nerve strain of such an exciting life, and after nearly a year of service he returned to Chicago, where he accepted, in 1874, the position of registrar in the University of Chicago. In this institution he almost immediately commenced teaching, first as Instructor in Botany, and two years later, in 1876, as Professor of Botany and Geology. In this same year he was chosen to lecture on botany in the Chicago College of Pharmacy, and for a short time conducted a class in analytical

chemistry, a fact which points to his broad knowledge of nearly all branches of science. Soon, however, he was assigned to the chair of Materia Medica and Botany. In 1878 he met a sad loss in the death of his wife, who left him one son, Edson S., only three months old.

In 1883 he resigned from the Chicago University in order to give his whole time to the College of Pharmacy, and in the same year he was married to Ellen Beardsley Reed.

During the next several years the world commenced to see some of the results of Professor Bastin's labors. He first established a botanical and microscopical laboratory, then issued, in 1887, his first book, the "Elements of Botany," which in 1889 appeared in a second edition, enlarged and entirely rewritten, under the title of "College Botany." It has been adopted by a large number of institutions not connected with pharmacy.

In 1890, after having resigned his position in the Chicago College of Pharmacy, Professor Bastin entered upon his duties as Professor of Botany and Materia Medica in the school of Pharmacy in Northwestern University. Here he organized his second botanical and microscopical laboratory, which was a model of completeness. In May, 1891, he was again left desolate by the loss of his wife, and in August, 1892, he was married to Abbie Beardsley, who, with two little daughters, survives him.

Up to this time Professor Bastin's writings had been largely confined to his text-books; but in 1892 several papers appeared in *The Apothecary* from his pen, viz.: "The Flora of the South Shore of Lake Michigan," and "Starches in Root Drugs." He also published contributions on "Plant Hairs," "Notes on Vegetable Histology," "Plant Crystals," and "Detection of Stem Admixtures in Root Drugs."

In the autumn of 1893, Professor Bastin was called to the chair of Botany and Materia Medica in the Philadelphia College of Pharmacy. This position gave him the opportunity to carry on the research work which it had long been his aim to do, and he entered upon his duties with an immense amount of enthusiasm. Notwithstanding the interruption and distraction necessarily accompanying the moving of his family to a new city, he had in one year established the third botanical and microscopical laboratory organized by him, he had conducted two large classes through a college year

of instruction, had published his important work, "Laboratory Exercises in Botany," containing several hundred illustrations from his own pen, and finally, he had made several contributions to the AMERICAN JOURNAL OF PHARMACY. The few succeeding years were no less active ones; during 1895 he published no less than nine illustrated papers on our local medicinal plants; one of these, "Veratrum Viride," contained a plate in colors, the original being from his brush. His research work during 1896 was devoted to the structure of the "North American Coniferæ." This series of papers was published in joint authorship with Henry Trimble, and was only partly completed at the time of Professor Bastin's death. All the drawings were from his pen. He was also engaged in preparing an elaborate work on materia medica, and he had mounted a great many sections of drugs for the purpose of making drawings from them. His inability to make rapid progress with this work was a great trial to him, and he persisted in it at intervals until March 18, 1897, when, after mounting two sections, he laid down his work forever.

Death came to his relief on April 6, 1897, the immediate cause being cerebral hemorrhage. He had not been well since the previous summer, but he continued to attend to all his teaching duties until the middle of December. What at first appeared to be nervous prostration, developed into exophthalmic goiter. His tremendous will-power kept him on his feet almost to the last, and as late as February he delivered one lecture, but it was like the last flaring up of a flickering light.

Professor Bastin was a member of several scientific societies, viz.: The Chicago Academy of Science, The Evolution Club, the Illinois Microscopical Society, The American Association for the Advancement of Science, and the Royal Microscopical Society of London. A short time before his death he was elected a member of the American Philosophical Society. He was also a member and trustee of the Philadelphia College of Pharmacy.

In studying the character of this man one cannot but be impressed with the wide range of experience he covered in 54 years, yet no one can say that he was not a master in every station in which he was placed. Whether as student, soldier, teacher, author or artist, he was a man, and a thoroughly honest one. His strict honesty with himself caused him to expect honesty in everyone else. An anecdote will best illustrate how binding he considered his own promise.

When he first came to Philadelphia he arranged for the publication of his book on Materia Medica, which was unfinished at the time of his death. It was afterwards shown very clearly to him that he could, with great advantage, give the publication to another firm, and he expressed his desire to do so but for his promise; and when asked: "Is there no way out of it?" the prompt reply was: "Yes, there is a way out of it, but there is no *honest* way out of it." It is almost unnecessary to add that the question of publication was considered settled from that time.

As a teacher, Professor Bastin was noted for his conscientious thoroughness; no amount of labor was too great for him to undertake in the interest of his students. He was an earnest advocate of the *practical* study of the natural sciences. When asked, during his preliminary visit to the College in 1893, if he would be willing to establish a laboratory for the practical study of materia medicá and botany, his reply was that he would not be willing to undertake to teach those branches in any other way. In his "College Botany" are some introductory paragraphs, entitled, "A Word to the Student," a few sentences of which should be read and re-read by every one engaged, or about to engage, in the study of botany. He says:

Remember that the study of botany is primarily the study of plants, and not the study of books about plants. If you study the book only, you will almost certainly find it dry and unprofitable, but if you use it as a guide to the study of plants, and study it PLANT IN HAND, verifying its descriptions by observations of your own, you will find the work not only profitable, but intensely interesting.

These few sentences say more than whole volumes could be made to say against the entire race of "Quiz Compends," "Aids," "Lecture Notes," "Home Studies," and all the other "short cuts" which are devoured but not digested by the great army of unprepared applicants for State Board Certificates. Professor Bastin's method of studying botany was either in the field, or with the microscope, but always with the plant or drug in hand, and his method of imparting instruction was the same. It remains but to speak of his domestic life, which, by those who knew, has been declared to have been an ideal one. He was especially fortunate in his matrimonial alliances, which caused the losses to bear more heavily upon him. He brought into his family the enthusiasm which he himself possessed

for the study of nature, and thereby drew the members into sympathy with him and his busy life. His funeral was from his residence in Merchantville, N. J., and was largely attended by his students and college associates. The burial was in the beautiful and historic cemetery of Colestown, a few miles distant. H. T.

RESEARCHES IN REGARD TO THE VENOM OF THE HELODERMA SUSPECTUM, COPE.

From the Physiological Laboratory of the Caroline Institute, Stockholm, Sweden.

By C. G. Santesson, Professor of Pharmacology.

Having had the opportunity to examine the saliva from three lizards of the above-named species, *Heloderma suspectum*, Cope, which were caught in Arizona and sent alive to the Zoological Institute at the Stockholm High School, and thinking that any new information in regard to this wonderful species of animals might possibly interest American readers, especially since the question of its poisonous nature has been enthusiastically discussed in American papers, I venture to submit for their perusal a short account[1] of the results of my experiments in this line.

Before beginning to relate the results of my own experiments, I must, however, call attention to several features in the discussion carried on in America, adding a few remarks of my own.

The fact that the anatomical structure of the heloderms suggests the probability of their being to a certain degree poisonous has been pointed out by Cope.[2] Numerous experiments made on animals by Sumichrast,[3] Boulenger,[4] J. Fayrer, in the *Zoological*

[1] My studies on this subject have been more completely published in German in a treatise with the title: "Ueber das Gift von Heloderma suspectum Cope, einer giftigen Eidechse," No. 5 of the festival volumes of *Nordiskt Medicinskt Arkiv*, dedicated to Prof. Axel Key, March, 1897.

[2] Cope: *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1867, p. 5; see also a postscript to an article by Shufeldt, *The American Naturalist*, Vol. 16 (1882), p. 907.

[3] Cfr. letter to Bocourt: *Comp. rend. de l'acad. des sciences*, t. 80 (1875), p. 676; furthermore, Sumichrast: *Bulletin de la soc. zool. de France*, Vol. 5 (1880), p. 178.

[4] Boulenger: *Proceedings of the Zoological Society of London*, 1882, p. 631; gives an account of Fayrer's observations.

Gardens, London,[5] of Weir Mitchell and Reichert,[6] and Garman,[7] have shown that the secretion from the salivary glands of the heloderms is more or less venomous. Frogs, hens, doves, guinea-pigs and rabbits always died of it, the two last-named kinds of animals generally very quickly. Cats and dogs did not die, but showed *local effects* of the poison (pains, swelling, extravasations, etc.). Two experimenters are said to have arrived at entirely negative results, viz.: Irwin, U. S. A., about whose experiments (made in 1867?) I have no explicit knowledge, and Yarrow,[8] who discovered *no positive results worth mentioning, neither after bites nor after subcutaneous injections, the animals always recovering soon.*

In regard to this last-named research, I beg to call attention to the possibility for *individual* variations to exist in the venomous nature of the heloderms, some individuals always or periodically being in a much smaller degree venomous.

The accounts of the influence of heloderma bites on man are of the greatest interest, as for instance the misadventure of Shufeldt[9]. In spite of the severe pains, swelling, etc., after the bite, this investigator still regards the animal to be harmless, and points out the fact that even the bites of men or cats may sometimes have a poisonous effect, although neither men nor cats are classified among the specifically poisonous animals. It seems to me that Shufeldt here mixes up two quite different things; the bites of men or of cats can certainly not be said to be specifically poisonous (as for instance is the case with snake-bites); but, on the other hand, they may very easily cause bacterial infection or "blood-poisoning." The symptoms observed by Shufeldt much resemble those brought about by the bite of our common viper (*Vipera berus*), *i. e.*, they resemble a slight specific poisoning, but *not* "blood-poisoning." It may, besides, be pointed out that an animal is not "harmless" because it does not kill. The bite of our above-mentioned viper does not, as a rule, kill grown-up persons, and still everybody looks upon it as a specifically venomous animal, and so it is, beyond all question.

[5] Short notice in the *American Naturalist*, Vol. 16 (1882), p. 842.

[6] Weir Mitchell and Reichert: *The Medical News*, Vol. 42, No. 8, Feb. 24, 1883, pp. 209–212.

[7] Garman: *Bulletin of the Essex Institute*, Salem, Mass., Vol. 22 (1890), pp. 60–69.

[8] Yarrow: *Forest and Stream*, New York, June 14, 1888, p. 412 and suc.

[9] Shufeldt: *The American Naturalist*, Vol. 16 (1882), p. 907 and suc.

There is another account of a person bitten by a heloderma, which is perhaps not so well known by our American readers. Mr. J. Stein, of Mexico, who once sent two heloderms to Fischer for anatomical and histological examination of their poison apparatus,[10] was on one occasion deeply bitten in a finger by one of them. *The finger and the whole arm swelled up considerably, causing the most violent pain, and his general condition was greatly disturbed.* For a long time afterwards the skin of the arm had a yellow, parchment-like appearance. Short as it is, this description of the specific local effect of a poison could scarcely be clearer. In accounts of death as a consequence of heloderma bites, it may, perhaps, not be worth while to place too great confidence.

Even the experience hitherto gained seems decidedly to show that the heloderms are specifically venomous, although their bites are less dangerous than those of poisonous serpents, and generally not fatal to men.

The heloderma on whose venom I have made the most of my experiments (from October, 1895, till February, 1896) was a female *H. suspectum* (Cope), 40 centimeters long, in good health. It could not be induced to bite animals, *was sluggish and good-natured. The venom was gained in the following manner:* With a pair of long, crooked tongs, I took a clean, dry sponge, about as large as a walnut, and forced the animal to bite it. When I had sufficiently irritated the reluctant animal, it would seize the sponge, and I then generally succeeded in pressing it into the animal's mouth. The venom in the sponge was then drawn out by means of a little quantity of 0·6 per cent. solution of common culinary salt. The fluid thus obtained was turbid, slimy, slightly alkaline, having an aromatic smell not at all unpleasant. Some simple preliminary tests showed that the fluid contained *protein substances;* these could almost completely be precipitated by alcohol in excess, the fluid having first been rendered slightly sour by the addition of acetic acid. If, after thus having acidified it, the fluid was instead boiled for a short time, a part of the albumen coagulated, while the rest remained in solution.

[10] J. G. Fischer: "Anatomische Notizen Ueber *Heloderma horridum* (Wiegm)." *Verhandl. d. Verens f. naturwissensch.* Unterhaltung zu Hamburg, 1883, pp. 2-16.

The poisonous liquid drawn out of the sponge by means of the weak solution of salt was afterwards subcutaneously injected into frogs, white mice and rabbits, *which all died of it.* By special experiments, I convinced myself that there was no other poison in the sponge, syringe, canula, etc. *The common symptom was a paralyzation of the nervous system*, setting in gradually after a short lapse of time and ultimately causing death. Convulsions were not observed in rats, and in rabbits only in a very slight degree towards the end (suffocating convulsions slightly indicated). In frogs the poisoning lasted from 57 minutes to several hours, a day and a night, etc.; in rats 56 to 85 minutes; a little rabbit lived 112 minutes. The frogs died of paralyzation of the heart;[11] the animals, on the contrary, seemed to die of the gradual paralyzation of the nervous system and the centres of respiration. If, on prolonged irritation of these latter systems, the heart had been primarily paralyzed, signs of acute inner suffocation, accompanied by dyspnœa and violent convulsions should have appeared, as was the case in the experiments of Weir Mitchell and Reichert (see note 6); but such was not the case to any degree worth mentioning. The difference between the results of these investigators and my own surely depend chiefly on their having, as a rule, used much greater doses than I did; they have, therefore, obtained a sudden paralyzation of the heart, while my experiments have brought about very gradual paralyzation of the nervous system.

On account of the way in which I collected the poison, I cannot say how great the doses were. The quantity of saliva taken amounted on one occasion to about 0·3 gramme, but surely both the quantity and the toxicity varied much on different occasions. That the poison is effective in very small quantities was proved by the following experiment: 1·8 milligrammes of dried poison was dispersed in a little water, only partly dissolved; was filtered and injected into a frog. The animal grew very weak and languid, but was, however, not totally paralyzed; did not completely recover until after a week. The *poisonous* part of this dose was certainly not more than a fraction of 1 milligramme.

A more minute examination of the development of the paralysis

[11] Frogs can, as a rule, hardly die from paralyzation of the respiratory organs, since they breathe so sufficiently through their skin that they can lie alive for weeks without lung respiration and afterwards recover.

in frogs showed that the central nervous system, the brain and the spinal cord were first affected by it, but afterwards it also attacked the termini of the motor-nerves in the muscles, producing a complete *curare effect*, while the irritability of the muscular tissues remained unaffected.

In the *heart of a frog* observed *in situ* without opening the thorax, the rate of pulsation after subcutaneous injection of the poison was observed at first to increase a little, then gradually to decrease until it stopped entirely. Shortly after the heart had stopped, or while the auricles were still beating slightly, the ventricle (after opening the thorax) usually seemed contracted and stiff, surely indicating a direct effect of the poison on the muscular tissues.

Weir Mitchell and Reichert have not observed any *local effect* of the heloderma venom. Probably this depended upon the hasty death of the animals on whom they experimented. In several experiments on frogs, I have discovered œdema, small extravasations, discoloring and fragility of the muscular tissues, etc., at the place of injection (mostly in the walls of the lymph-sinus of the thorax and abdomen). In a rat I once observed a greenish-brown discoloring of the tissue around the place of injection. Furthermore, in many accounts of former experiments on animals, and also in accounts of cases in which people have been bitten (Shufeldt, Stein), we read of more or less marked local effects of the poison. Local *gangrene* is, however, not mentioned, and, as a rule, the local effects have soon disappeared.

On mucous membranes (the mucous membrane of the stomach and the conjunctiva) the heloderma poison does not seem to have any injurious effect.

By means of some special experiments, I have furthermore tried to discover how the poisonous part of the heloderm saliva is affected by *alcohol* and *boiling*. If to the poisonous fluid, which has been rendered a trifle sour by the admixture of acetic acid, alcohol is added in excess, *all* the poison may be precipitated, in case the process is carefully carried out. If the alcohol is then filtered off from the poison and allowed to evaporate, and if the residues, after the evaporation of the alcohol are dispersed in acid water, the liquid thus obtained is uneffective. Thus, *poisonous alkaloid substances*, which ought to have dissolved in alcohol and then in acid water, *were not to be found.*

The alcoholic precipitate was again partly dissolved in water (after the alcohol had been removed), and this solution *always* had a fatal effect, accompanied by the usual symptoms, sometimes so suddenly (a frog died in fifty-seven minutes) that there is all reason to suppose that the *whole* of the poison had again been dissolved. From this the important conclusion may be drawn that the poison probably *does not*, or at least only to a small degree, *belong to the group of common albuminous* substances (*albumin, globulin*), which soon become so altered in alcohol that they cannot be again dissolved in water. On the contrary, the venomous principle ought, probably, to be looked for among the nuclein substances, the albumoses (albuminoses?), the peptons, the mucoid substances, etc.

If the poisonous liquid rendered slightly sour by acetic acid *is boiled*, coagula are formed, as before mentioned. These are not poisonous if well washed with water; but if not washed, a more or less considerable amount of the venom is liable to adhere to them, and this venom may afterwards be soaked out of the coagula, and it is then even able to cause fatal poisoning. That which is coagulated by boiling and is insoluble in water probably consists of common, harmless albumen. Thus it may be seen that the poison, when boiled with acid, remains in solution. On the contrary, with alcohol it may be precipitated from this solution, but may again be dissolved in water. These circumstances also point out that the venom is not an albumin or a globulin, but belongs to the latter of the above-named groups of protein substances. The fact that the poison is not destroyed by boiling shows that it *is not an enzym* (*an unorganized ferment*), as these are usually conceived.

When the poisonous solution is brought into a slightly sour reaction by means of a *small quantity* of acetic acid, there is no precipitation. Consequently, *true mucine is not present in any great quantity.*

Since the supply of material which I was able to obtain was very small, it was rather difficult to determine the *chemical nature of the venomous substance or substances.* I therefore applied to my colleague, K. A. H. Mörner, Professor of Medical Chemistry in Stockholm, who had the kindness to undertake this work, while I myself made the experiments on animals required for these tests.

The poisonous solution, rendered a little sour by acetic acid, was precipitated by alcohol in excess; this precipitate was dissolved in

water and was again precipitated by acetic acid and brought to a tolerably strong sour reaction. In this precipitate there was found phosphorus, organically bound; here there was, therefore, undoubtedly, some *nucleiniferous protein substance* present.

But was this substance poisonous? From another quantity of the poisonous secretion, the nuclein substance was again isolated, dissolved in water with a little soda, and injected into a frog. The animal soon grew weak, bled continually, though slowly, from a small wound on one of its lips, and died after three days. On dissection, I found a great number of small extravasations of blood in the muscles of the thorax and even some in other places. We see here (at least partially) the characteristic effects of nuclein substances on the blood (diminished coagulating power, extravasations). If a stage of increased coagulating power had preceded, I do not know. If the solution of heloderm poison is directly applied to defibrinized blood (of a rabbit), the blood-corpuscles seem to take a spherical form, which reminds us of the effect of the *snake-poison globulines*[12] of Weir Mitchell and Reichert.

The solution from which the above-named poisonous nuclein substance was removed by precipitation with acetic acid did not contain any albumin which coagulated on boiling. On the other hand, Millon's reaction showed the presence of some protein substance. With sulphate of ammonium in substance, a considerable downy precipitate of *albumoses* was obtained. After these had been filtered off, the liquid (the filtrate) gave no "*biuret-reaction*;" consequently *true peptons were not present.* In the liquid from which the nuclein substances had been removed, albumoses could still be displayed by means of ordinary culinary salt and acetic acid; these called forth a turbidness which disappeared on boiling and reappeared when exposed to cold.

From another sample, the *albumoses* were isolated in the above-described manner with neutral sulphate of ammonium in substance, were then separated as much as possible from the ammonium salt, were dissolved in water and precipitated with alcohol. The latter treatment was repeated once more, and at last the new alcohol precipitate was dissolved again in water. This solution of albumoses, which still contained some sulphate of ammonium, was injected into

[12] Weir Mitchell and Reichert: "Researches upon the Venom of Poisonous Serpents," Washington, 1886.

a frog. The frog soon grew weak, almost paralyzed, but did not die. On the contrary, it gradually recovered, but after ten days was not yet quite normal. It was then killed; no extravasations were visible. (With a larger dose of sulphate of ammonium injected into another frog, it was shown that this salt called forth quite different symptoms.)

From the experiments here related, it may be seen that *the principal venomous elements of the heloderm saliva consist partly of nucleiniferous substances and partly of albumoses.*

By special experiments it was at last shown that *aqueous extract from the poisonous glands of the heloderma and the blood of that animal* possessed poisonous qualities.

Consequently, my observations most decidedly support the assertion of the majority of experimenters, especially Weir Mitchell and Reichert, that the *heloderms are specifically poisonous animals*, even if, as a rule, they are not aggressive towards men, and, on account of their sluggishness, only seldom do any harm. A heloderma is, at all events, an individual to be suspected, even if it does give but very little reason for the name "horridum." As a playmate for children (Cfr. Weir Mitchell and Reichert, note 6), it is certainly not suitable.

STOCKHOLM, June, 1897.

THE PHARMACIST AND THE MICROSCOPE.[1]

BY HENRY KRAEMER.

The topic of "The Microscope in Pharmacy" is by no means a new one. In this country for at least the past twenty years it has been a theme upon which comparatively many have written. Upon looking over some of these papers one is struck with the loyalty of the authors to the microscope, in describing its construction, uses and even possibilities. Nevertheless, one cannot but feel that the situation has been viewed in most cases from some other standpoint rather than the practice of the profession of pharmacy. The idea that seems to pervade the atmosphere is that all that is necessary for the pharmacist is to procure the necessary apparatus (microscopes, reagents, etc.) and books and to follow the directions given. One furthermore receives the impression that, because

[1] Presented at the New York State Pharm. Assoc., July 13, 1897.

vegetable drugs possess characteristic structures, therefore, the pharmacist ought to use his microscope in determining all of the drugs that he buys. The result of this kind of writing has, to some extent, hindered our progress in practical pharmacognosy in this country.

ONE MUST BE TAUGHT.

To possess a microscope and not know how to use it, or to think one knows how to use it, and spend one's time by one's self in endeavoring to interpret what is revealed there, is both money and time wasted. In order to obtain results that are reliable in using a microscope for any purpose, one must know how to use the instrument and understand the structures in the department (say botany) where it is to be used. This necessary knowledge can come only by being instructed properly. Of all the instruments yet devised in the prosecution of scientific research, there is none that requires that its user shall be better taught in the foundation and guiding principles of the science in which he engages, than the microscope. It is extremely unprofitable for any one to have the idea that he can teach himself the use of the microscope in the science in which he proposes to apply it. It looks very inviting to see a good illustration and to read of sectioning, mounting and examining a drug with the microscope. It is another thing to do the work and see the points. Experience teaches us that a beginner finds no help in the illustrations of books. What the beginner needs in doing microscopical work are not illustrations or facts, but ability to use his hand, eye and brain rightly. *One must be taught, i. e., guided to knowledge.* Time must first be consumed under a competent teacher in mastering the construction of the instrument and in becoming familiar with the methods of doing microscopical work and in learning the foundation and guiding principles of morphology (both outer and inner) of the plant kingdom. After this is accomplished the student will find books helpful. Now he can use his hands properly, see with his eyes correctly and interpret with his brain rationally. The more knowledge that is gained by personal observation the stronger and more self-reliant will the student become.

A broad botanical or even biological university training is the best foundation and is necessary to accomplish the best work with the microscope. It cannot be said, however, that this is absolutely

necessary in the prosecution of the microscopical work by the pharmacist. It is necessary for him, however, to have mastered the foundation principles of physics, botany and chemistry in order to get the results that are of practical value to him. Some of our schools and colleges of pharmacy are now prepared to give their students a good start in this direction. The student must not be dismayed, but, on the contrary, expect "to make haste slowly" at first. He must exercise patience in learning to section drugs and work persistently under a competent instructor until he understands the principles of his subject. Nature does not unfold herself unless you work patiently and incessantly at her. When one problem is well worked out, the next is easier, so that by the time the student is master of his subject, results come comparatively easily.

TIME AND PLACE FOR USE OF THE MICROSCOPE.

Having shown that instruction is necessary in order to secure reliable results from the use of the microscope in pharmacy, the illusion that the microscope is necessary on all occasions must be dispelled. While it is an indispensable instrument sometimes, it does not follow that it must be used always, any more than because an axe is used to chop down a large tree, that therefore an axe is necessary to break up every piece of wood. The microscope has its time and its place for use by every one who is accustomed to using it in his special line of work. It is as superfluous for the educated pharmacist to use his microscope in the examination of each lot of nux vomica or calumbo that he buys as it would be for the field botanist to require to make a microscopical examination before he could determine, say, Castanea dentata or Quercus alba. In fact, it bespeaks lack of knowledge in the botanist. It likewise reflects on the professional pharmacist who wishes to make sections of those drugs which are so characteristic in a crude condition, and which by experience he ought to distinguish at once. The microscope is to be employed only when more refined tests are necessary.

APPLICATIONS OF THE MICROSCOPE IN PHARMACY.

Upon the completion of a proper laboratory course, and being well grounded in the various sciences necessary for the use of the microscope in pharmacy, we must also recognize that in the use of the microscope there is a training of the eye (a sharpening of it, so to speak), so that the trained eye, with the other senses (educated

too), are all to be employed where necessary in determination of drugs. Now, there are times when the use of the microscope alone is essential, whereas at other times it is rather a convenience in the practice of pharmacy. Some of the applications of the microscope in pharmacy are the following:

(1) *Examination of Some Crude Drugs.*—While appearance, odor, taste, etc., are generally sufficient aids in determining most of the commercial crude drugs one from another, still there are instances where a microscopical examination is desirable and necessary. This is especially so when certain drugs occur in relatively small pieces, or when two or more drugs that possess similar characteristics are supposed to be intermixed or incorrectly labelled. The microscopic structure will generally enable one to quickly dispose of such doubtful cases. The following crude drugs of the U.S.P. require not infrequently a microscopical examination for their accurate determination, especially when they do not appear in the forms usually seen in commerce:

Mexican sarsaparilla from Honduras sarsaparilla.

Belladonnæ radix (the horny kind) from Inula.

Belladonna folia from Stramonii folia.

Serpentaria,[1] from Spigelia.

Granatum from Xanthoxylum.

There are a few cases in the examination of crude drugs where microscopical examinations have been advocated, and while sometimes necessary, the quality and nature of adulterant may frequently be told by the eye alone, as Crocus, etc.

(2) *Examination of Powdered Drugs.*—In recent years powdered drugs have been introduced to such an extent that in many retail pharmacies few crude drugs are to be found. Drugs in the powdered condition may be obtained pure, but adulteration is more easily effected. The reason for this is owing to the inability of the average pharmacist in detecting it. We notice that some State Boards in their examinations give the candidates very few, if any, crude drugs for determination. In time there can be no doubt but that the candidates for the State Board examinations will be required to identify powdered drugs and pronounce on their quality. This is desirable for the sake of the profession of pharmacy, and in accord

[1] The microscope is not necessary here, as will be shown in an article to be published later.

with the spirit of the State Boards in giving the candidates as practical examinations as may be possible. The microscope must, in this province, be used, as only by means of it can one determine most of the powdered drugs and pronounce on the quality of all. By means of the microscope, drugs of different origin may readily be determined, as the various sarsaparillas, sennas, ipecacs, etc.

(3) *As a Preliminary Step in the Study of Plant Constituents.*—The microscope is of undoubted service as a preliminary step in conducting chemical examinations of drugs. The nature of inorganic substances (as $CaCO_3$, CaC_2O_4, SiO_2, etc.) may readily be detected. The nature of some carbon compounds (as starch, sugar), and active principles (as oils, resins, tannins or other substances) may be detected qualitatively.

(4) *In Determining the Relative Value of Drugs.*—It not infrequently happens that two drugs of different origin or habitat are used in medicine, and that the cheaper contains the larger percentage of active principles. A chemical assay may be resorted to; but when purchasing a small quantity of a drug this might not pay. By means of the microscope, however, an approximate comparison may be instituted, even quantitative results may be obtained, as has already been shown, and will be further demonstrated in a forthcoming paper. This applies not only to powdered, but also to crude drugs. The following instances may be cited:

(*a*) *Gingers.*—The African ginger is cheaper than the Jamaica ginger, but the former contains more secretion cells, which are about the same size in both. Hence, the African, though cheapest, assays a higher percentage of oleoresin.

(*b*) *Buchus.*—The short buchu is cheaper than the long buchu, but resembles the former, and contains much larger and more numerous secretion reservoirs than the latter; hence the "short buchu" assays more oil than the other.

(5) *In Determining Loss of Active Principles.*—It is possible in some cases, without resorting to a chemical assay, to determine whether the active principles have been removed. This is notably so in drugs that contain alkaloids, secretion reservoirs or secreting hairs, as cinchona, ginger, cloves, or any labiatæ.

(6) *In Determining Identity and Quality of Spices and Foods.*—Since the introduction of spices in a powdered condition into the household there has been the most flagrant kind of adulteration

practised. In many cases the microscope is the only satisfactory means for determining the purity and nature of adulterant.

A few illustrations may be given:

(*a*) *Pepper* is adulterated with mustard hulls, wheat flour, etc.

(*b*) *Bermuda Arrowroot* with other arrowroots and starches.

(*c*) *Tea* with the leaves of Salix alba, Sambucus nigra, etc.

(7) *In Determining Unknown Drugs.*—It often occurs that a pharmacist receives for identification samples of drugs that are unknown to him. It may be that they are common indeed and indigenous to this country. The microscopic examination at once gives one a start. The compound microscope is, indeed, playing a very important part to-day throughout systematic botany. Certain groups or families or genera are found to possess a certain characteristic inner morphology, and this is the key to the solution. It may be that the arrangement of the elements of the fibro-vascular bundle is peculiar, or that the shape of the element (root, stem, etc.) is characteristic, or the identification may be based on the nature of secretion cells, or form and nature of hairs, etc. In leaves the habitat may sometimes be determined by reason of the structure.

(8) *In Biological and Sanitary Analysis.*—The advancing pharmacist is taking upon himself the study of these branches, which are more or less directly related to medicine, and for which there is evidently a growing demand. He is making the biological as well as chemical analysis of water and reporting on the condition of sputum, urine, etc., of the patients of the physician. In all this kind of work the microscope is necessary.

(9) *For Other Practical Purposes.*—Recently some one wished to examine the number of meshes in some sieves. The compound microscope was recommended for the purpose, the principle of the method followed being the same as that used in measuring the lengths of cells, etc.

The microscope may be used in detecting forgery, in determining the writing on soiled labels; also in ascertaining the kind of writing paper, labels, etc., that are purchased, etc.

THE INFLUENCE OF THE USE OF THE MICROSCOPE.

From what has preceded it is seen that the microscope has a very important bearing on the practical work of the pharmacist. It would not be proper in an essay of this kind to fail to record the

influence of the microscope in the training of the pharmacist. The use of the microscope does for him—as it does for all—an infinite amount of good that must not be overlooked. It makes better observers of all. The early workers with the microscope often remarked that it enabled *the worker to see with the naked eye afterwards structures that were invisible to him before he used the instrument.* By means of the simple lens one is enabled frequently to make out those characteristics of a drug that he has seen with the compound microscope. Finally, with the naked eye alone, one can, by experience, obtain results in determining the quality of drugs that are based on structure and not on ephemeral external characters.

RESULTS OF THE USE OF THE MICROSCOPE.

We must not be discouraged by reason of the sceptic and his oft-repeated question: "What is the use?" The sceptic is as useful in treating this subject as he is in other problems. In the applied sciences this question is ever before the student. The pure scientist, in his pure science, need pay no attention to the query. But the business and professional man feels it necessary to devote his energies to those things only that will bring forth useful fruits. There is, however, an insurmountable difficulty in following the applied sciences; one cannot predict what scientific fact or discovery will be the basis or part of a principle in the construction of some useful invention. Hence we find it necessary to take in more than we can use practically, and are silenced for the time sometimes by the question: "What is the use?" Nevertheless, we are safe in recording some of the results that accrue to the educated pharmacist from his use of the microscope. The benefits are two-fold, viz.: to the pharmacist and to the public.

(1) *To the Pharmacist.*—The pharmacist is able to dispense drugs, foods and spices, the purity of which he can guarantee. This means to him and for him:

(*a*) The most efficient of co-operative work with the physician.

(*b*) The building up of a good pharmacy, the name of which shall endure.

(*c*) The establishment of confidence in him by the best physicians and the public. To have a good custom one must sell good drugs.

(*d*) The pharmacist receives the value of his money for his purchases. He does not pay a high price for an inferior drug, as a Honduras price for a Mexican or other sarsaparilla.

(*e*) The conscience of the pharmacist is clear, as he knows what he is selling.

(*f*) It is also an advertisement to the pharmacist, and he may judiciously utilize it in the building up of his estate here.

(2) *To the Public.*—The public receive in return pure drugs, foods and spices. This means to them :

(*a*) Confidence in the pharmacist, which sometimes may prolong and even save life.

(*b*) Satisfaction in the goods for the money paid.

ARGUMENTS AGAINST THE USE OF THE MICROSCOPE.

(1) It requires an educated person to use the microscope to any advantage. A mere merchant could not use it with profit. It requires that one shall have spent time and money in acquiring a proper education. Hence, they who have never been instructed by a competent teacher cannot practically avail themselves of the benefits of the use of the microscope.

(2) The cost of the outfit, being at least $25, makes some persons, who might use it profitably, think too long about purchasing a microscope.

(3) Time must be given to the use of the microscope. Many pharmacists feel that if there is any time to spare it ought to be given to "resting up" or waiting for the next rush of business.

(4) It takes "nerve" or backbone for one to go to college, to buy a microscope, to give the time that is necessary for securing results and to believe that all will pay in the end.

(5) The merchant who wishes to purchase his goods at the lowest price, regardless of quality, does not care to be able to know whether the guarantee of the seller for purity is correct. He would rather sell impure and adulterated goods with the clear conscience of wilful ignorance.

CONCLUSION.

A good education is necessary for a professional pharmacist, and he alone who is taught properly can use the microscope advantageously.

The microscope may be utilized in so many practical ways by the

educated pharmacist that the receipts far outweigh the cost and time. The light in the sky is already appearing, the clouds are rising higher and higher on the mountain side, and the practical pharmacists are ascending one by one to higher flights than where they rested yesterday, and they follow those who it sometimes may seem are working in the clouds, yet who, nevertheless, when the light shines, are seen to be laboring for the benefit and the future of pharmacy.

THE TANNIN OF CASTANOPSIS.

By Henry Trimble.

In the June number of this Journal, p. 296, attention was called to the presence of strontium in the bark of several species of castanopsis received from Dr. H. N. Ridley, of the Singapore Botanical Gardens, India. These barks have also been examined for tannin; and the results are now tabulated along with those from two species of oak also from Singapore, and two samples of the one species of our native castanopsis, C. chrysophylla. The results on one sample of the latter were published in the *Garden and Forest*, **8**, 293, July 24, 1895; the editor, Professor C. S. Sargent, adding some remarks concerning the genus, which, by reproduction here, will throw additional light on the subject.

As is well known, the bark of Quercus densiflora, of California, is popularly considered the most valuable tanning material produced in the Pacific States of North America. This oak is the only American representative of a peculiar group of trees which inhabit southeastern Asia, and are intermediate in botanical characters between the true oaks and the chestnuts.

There is another genus, Castanopsis, which is also intermediate between the oaks and the chestnuts, and also of southeastern Asia, but, curiously enough, with a single representative in Oregon and California, Castanopsis chrysophylla, a very beautiful tree, which the Californians call the gold-leafed chestnut, from the bright golden scurf which covers the lower surface of the leaves. Some botanists treat Castanopsis as a section of Castanea, while others, like Dr. King, of Calcutta, who made a special study of the genus, although finding no very good characters by which it can be distinguished from one of the Asiatic sections of Quercus, maintain the genus for the purposes of convenience. The relationship of this tree to Quercus densiflora on one hand, and to the chestnut on the other, suggested that its wood and bark might contain valuable tanning properties.

The result of a comparison of the American Quercus and Castanopsis, was to show that the tannin of Castanopsis chrysophylla is

identical with that from Quercus densiflora, and, therefore, with all the other species of oak which have hitherto been examined by me. Since chestnut tannin is identical with gall tannin, and that from the oak is quite a different substance, the result from a chemical standpoint, placed the Castanopsis chrysophylla with quercus.

The natural sequence of this investigation was a desire to examine the several species of castanopsis of India, where all the other members of the genus grow, and through the kindness of Dr. Ridley this has been possible. It is to be regretted, however, that only the percentage amount of tannin and some general characters can be given at this time, since there was not sufficient material to admit of a final decision in regard to the composition of the tannin. The attempt was made to purify two lots of tannin from these barks, but it is only safe at present to state that the indications point to the presence of oak tannin in all the Indian species. An additional liberal supply of the bark from the American species was also received from Miss Alice Eastwood, of the California Academy of Science, collected by Dr. Geo. McCowen, Ukiah, California.

	Moisture.	Ash in absolutely dry sample.	Tannin in absolutely dry sample.
Castanopsis Wallichiana . . .	8·94	4·40	5·37
" Curtisii (old tree)[1] .	8·53	2·03	16·07
" " (young tree)[2]	6·81	4·41	7·21
" Javanica	6·93	4·61	8·06
" Hullettii	6·51	3·77	6·73
Quercus hystrix	7·00	6·20	8·60
" discocarpa	7·27	3·93	5·28
Castanopsis chrysophylla . . .	42·72	3·70	18·92
" " . .	10·43	0·61	8·58
Quercus densiflora	10·31	2·46	16·12

[1] Collected in Penang.
[2] " " Singapore.

The two specimens of Castanopsis chrysophylla were quite different in character; the one showing the large percentage of moisture was

taken from a shrub, and was received while in the moist green state, a condition favorable to a large yield of tannin; the other was apparently from a much older tree, and apparently much of the tannin was changed to an insoluble red coloring. The low ash cannot be accounted for.

In connection with this the following description of the Indian species by Dr. Ridley may be of interest.

Castanopsis Wallichiana. Nuts commonly eaten. If there are not two species mixed under this name, the leaves are very variable.

C. Curtisii, King. Native name, "Berangan Janthong." One from the type tree in Penang, marked "old tree," the other marked "young tree," brought by a native collection from our forests here; though the collector persists it is Curtisii, I have never myself seen this species in Singapore.

C. Javanica, King. Native name, "Berangan Gajah." I think two species may have been placed under this name by Dr. King. The fruits of the sample sent are very large; nuts single, oblong, about three inches in length; they are purgative when eaten.

C. Hullettii, King. Native name "Berangan Papan, *i. e.*, plank chestnut. A big tree, nuts bitter, not eaten.

Quercus hystrix. Native name, "Mempening." A very common oak in Singapore.

Q. discocarpa, from Penang. I hardly see why this is not a Castanopsis; the fruit is just that of one.

RÉSUMÉ OF RECURRENT TOPICS.

By William B. Thompson.

The Gradations of Chemistry.—In the classification of the various branches of this science (and the divisions are very numerous, as well as comprehensive), it will be observed that some attach naturally to therapy and others to that of pharmacy. In a general sense we may say that the physician who fails to give full consideration to biological and physiological chemistry cannot be correct at diagnosis. Whilst, on the other hand, the pharmacist who omits to comprehend the relations of toxicological and pharmaceutical chemistry cannot proceed intelligently in applying knowledge to his art. A pharmacist appreciating the aids to the pursuit of his business could wisely adopt as a special study one of the many divisions of chemical science. Practice in this might, in time, be made remunerative. Apart from the utility, it is a most enticing and absorbing theme, and furnishes the key which unlocks some of the most profound and amazing mysteries of the material world. A taste of

this knowledge begets a thirst for more. Chemistry might be selected by choice and made an auxiliary to business, and to business titles, a deserved or earned title being more worthy than an assumed one. Once rescued from the commercial slough by the absorption of its numerous allied sciences, pharmacy ought to rise again to its true sphere and mission.

Herbs and Simples.—In the earlier days of medical and domestic practice, when vegetable substances were chiefly in vogue as remedies, there was quite an original subdivision according to their properties—suggestive, sensible properties. For instance, there were the so-called five great aperitive roots—smallage, or celery; fennel, parsley, petty-whin, and asparagus—the title aperitive having the same derivation as our modern word aperient, the latter being considered more in euphony. Then there were the *four* lesser *cold seeds*—succory, or chicory; lettuce, purslane, etc.,—and the four lesser *hot seeds*—celery, parsley, bishop weed and wild carrots. Next, the four greater *cold seeds*, of which the pumpkin is a type, and the four greater *hot seeds*, and so on. It will be noticed that these distinctions were not medical in any sense, but based on the plainest descriptions, hot and cold, our present pungent carminatives constituting the former, and the mucilaginous and saccharine the latter. Many of these were in established repute, and the observations upon their properties are so specific as to convince us that the effects were based upon absolute demonstration. With a large class of persons there yet lingers a strong predilection in favor of vegetable medicines. If we except the tonic varieties, their reasonable use can never be harmful. Can we say as much for the minerals? We cannot, however, revive the faith that once existed, and these substances are now the drug-store stock of indefinite age, and often indistinguishable.

Artificial Peptic Action on Food Substances.—That food may be partially digested, or pre-digested or peptonized by artificial process, and yet preserve such elementary state or condition as adapts it to the needs of the human body, is an open and debatable question. If the primary digestion only produces so-called peptones, and *true* peptones (which have never been isolated or identity established) are inseparable from the acting function of the human stomach or the animal chemistry of food-conversion, then we are somewhat at sea without a chart, for we cannot produce peptones arti-

ficially. It is quite a simple process to cause the animal ferments in certain favorable media, and, under the influence of heat, to act upon substance, and also to change the molecular or physical character of such substance; but it is a wide stretch of assertion to say that this altered condition is an exactly similar result to that change which food undergoes in the animal alimentary receptacle. This subject is, perhaps, more of a physiological than of pharmaceutical import; but as articles which come under this category are offered to the public for self-use and adoption, the knowledge of the apothecary is often sought in explanation of many things the lay community do not understand. It never meets the question of scientific adaptation, to merely say, "Oh, such articles are popular and sell largely." We all know how popularity may be secured through the free medium of printers' ink. If there is that which should be or can be understood, let us have the true knowledge to either guide our judgment or correct our errors.

Chemistry as Applied to Industrial Arts.—The thought occurs that, when knowledge in special branches of science becomes an application to industrial pursuit to art and to trade, there should arise, in this country, a national spirit to foster and encourage technical education in these arts, etc., etc. Take the production of chemicals of the synthetical class, for instance, as an applied industry, and also consider the science with non-general adaptations. There must exist a constant need of educated knowledge and skill in the departments of work and labor. This want is likely to increase by natural growth, but could be vastly extended by a systematic encouragement. The pharmaceutical student who imbibes a taste for, and inclination to pursue the study of this fundamental rather than collateral branch of science, and to make of it a special vocation, has very meagre stimulus here. How can we avoid seeking the necessary aid of foreign talent when we have, comparatively at least, none of our own? We have never promoted enlarged and liberal views on this and many other subjects of national economic importance. The student in chemistry, out of his novitiate, seeking to apply his knowledge, finds but limited opportunity open, and he must search and hope with discouraging result. A self-constituted committee of patrons, or patronage composed of manufacturers and others whose capital is embarked in the application of chemical science, either wholly or partially to the operations of industrial

arts and trades, or those who regard the aid of this special science, should ally themselves in some movement or purpose having the education of the American youth in view. Beyond the pale of commerce there is indeed very little conception of the vast inroad which German manufacturing chemists have made upon our industries. We are paying a very expensive tribute to their foresight in fostering a talent among their own people, which we neglect or overlook in ours. We are paying large annual sums to foreign firms and corporations for products which we can, and should make. In no region are crude materials so abundant as in our own country. A utility of these would add to *our* national wealth—give employment to our educated labor—instead of contributing to foreign capital. We need, now, urgently, every possible advance of occupation availed of in this country; our hands stand ready reaching for employment. In this also, we have involved a most serious social problem, a growing condition which will require adjustment in the not distant future, when it may require more wisdom to adjust than the present need demands.

THE NORMAL URINE.[1]

By Charles Platt.

The various compilations current as "Text-books of Urine Analysis" differ materially in their statements as to the average composition of a normal urine. In many cases, indeed, the authors have not even attempted to reconcile their "totals" with the figures given for individual constituents; but aside from this, which is, of course, the result of carelessness on the part of the compiler, we find great variations in the original figures, due not so much to errors of determination as to failure to secure representative samples for analysis. Normals determined for one nationality, or for one class of one nationality, are commonly applied indiscriminately to all without regard to fundamental differences in conditions. For instance, the average American's habit of life is not that of the German student, and yet it is a fact that the majority of figures given in our text-books have originated with the observations of German professors, working in conjunction with their student assistants.

In view of this laxity in text-book statement, the writer has for

[1] *Jour. Amer. Chem. Soc.*, 19, 382.

several years made careful records of all urine analyses with due attention to the age, sex and health of the individuals supplying the samples, and these figures (in all cases compared with and in some cases averaged with those of foreign observers) are now given in the following table:[2]

THE NORMAL URINE.

Color	Pale amber, straw-yellow.
Appearance	Clear or with faint cloud of mucus.
Odor	"Aromatic."
Reaction	Acid. Acidity in 24 hours equivalent to 2-4 grammes oxalic acid.
Specific gravity at 15° C.	Range for adults, 1.015–1.025. Averages: Man, 1.020; Woman, 1.018.
Quantity	1100-1600 c.c. in 24 hours. Averages: Man, 1450 c.c. (22 c.c. per kilo of body-weight); woman, 1250 cc.

		Averages for adults.		
		Man.		*Woman.*
	Normal urine. Grammes.	*Grammes urine in 24 hrs.*	*Grammes per kilogramme of body-weight.*	*Grammes urine in 24 hrs.*
Total solids	45.0 –65.0	60.0	0.91	51.0
Urea	20.0 –50.0	34.0	0.51	30.0
Uric acid	0.3 – 0.8	0.6	0.009	0.5
Creatinin	0.4 – 1.3	0.9	0.014	0.8
Hippuric acid	0.4 – 1.0	0.7	0.010	0.6
Xanthine, sarcine, etc.	0.001–0.010	0.005	—	—
Oxalic acid	0.020–0.030	0.025	—	—
Glycero-phosphoric acid	0.010–0.020	0.015	—	—
Propionic, valeric, caproic and butyric acids	0.008–0.080	0.040	—	—
Phenol, cresol, etc.	0.005–0.020	0.010	—	—
Sulphur dioxide in ethereal sulphates	0.090–0.500	0.250	—	—
Indoxyl sulphuric acid (calculated as indigo)	0 005–0.019	0.008	—	—
Thiocyanic acid	0.001–0.008	0.005	—	—

[2] Authors consulted: J. Vogel, Loebisch, Kerner, Daiber, Hammarsten, Neubauer, Pflüger, Voit, Salkowski, Liebermann, Brieger, Hoffmann, Dragendorff, Munk, Hoppe-Seyler, Yvon and Berlioz, Lehmann, Uhle, Ranke, Furbringer, Geschleiden, Moritz, von Jacksch, Planer and Morin, Magnier, Robuteau, Gautier, Becquerel, Méhu, Halliburton, Charles, Parkes, Black, Bence-Jones, Tidy and Woodman, Beale, Parrot, Breed, Oliver, Thudichum, Weidner, Purdy, Tyson, Grüner, Jaffé, Rankin, von Franque, Oppenheim and Meyer.

	Normal urine. Grammes.	Averages for adults. Man. Grammes urine in 24 hrs.	Man. Grammes per kilogramme of body-weight.	Woman. Grammes urine in 24 hrs.
Paraoxyphenylacetic, paraoxyphenylpropionic, dioxyphenylacetic, and paraoxyphenylglycollic acids	0·010–0·030	0·020	—	—
Bile salts	0·0 –0·010	0·008	—	—
Urobilin, urochrome, etc.	0·080–0·140	0·125	—	—
Carbohydrates (Reducing power of normal urine equivalent to an average of three-tenths of one per cent. glucose.)	0·014–0·075	0·044	—	—
Sarco-lactic, succinic, glycuronic and oxaluric acids, acetone, inosite, cystin, taurin, urorubinogen, urorubin, pigment of Giacosa, scatoxylsulphuric acid (often in considerable amount), scatoxylglycuronic acid; nephrozymase, pepsin, and other ferments; pseudoxanthine, paraxanthine, heteroxanthine, guanine, adenine, etc.; pyrocatechin, hydroquinone, protocatechuic acid, etc.	traces	—	—	—
Chlorine	5·0 –10·0	7·3	0·110	6·0
Phosphorus pentoxide	2·0 – 3·5	3·0	0·045	2·5
Sulphur trioxide	1·5 – 3·0	2·2	0·033	1·9
Potassium oxide	2·5 – 3·5	3·0	0·045	2·8
Sodium oxide	4·0 – 6·0	4·5	0·068	4·0
Ammonia	0·5 – 0·8	0·72	0·010	0·6
Calcium oxide	0·2 – 0·4	0·30	0·0045	0·28
Magnesium oxide	0·3 – 0·5	0·40	0·0066	0·35
Iron	0·001– 0·010	0·007	—	—
Silicic acid, carbonic acid, hydrogen peroxide, nitrates, nitrites and metals; *e. g.*, manganese and copper	traces	—	—	—

GASES[1] IN NORMAL URINE.

	In 100 volumes of gas. c.c.	In one litre of urine. c.c.
Carbon dioxide	65·40	15·957
Oxygen	2·74	0·658
Nitrogen	31·86	7·775
	100·00	24·390

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[1] Morin, after Loebisch.

AN INVESTIGATION OF THE OFFICIAL PRUNUS VIRGINIANA, TO DISTINGUISH IT FROM BARKS COLLECTED AT OTHER SEASONS.[1]

By Grace E. Cooley.

A contribution to the work of Research Committee C, of the Revision Committee U.S.P.

The U.S.P. prescribes that wild cherry bark be collected in autumn, when it yields the greatest amount of hydrocyanic acid. This investigation has failed to furnish any distinctive histological mark of the bark collected in autumn, and the results have tended to the belief that the suitable test is a chemical one, not readily to be found by the use of the microscope.

The following results are presented with tests which are found accurate, so far as they have been applied.

The researches of Fischer[2] have shown us the phases which starch undergoes in the bark and wood of most trees during the year. These have been verified with regard to *Prunus serotina*, and give us an easy means for rejecting all barks collected in summer and winter, for they contain no starch at all, or very little. During September and late summer the starch is being stored up in the bark, and reaches its maximum amount in October and the first days of November, just after leaf-fall. At this time all the cells of the medullary rays, and the bast parenchyma, as well as the chlorophyll-bearing cells, are crowded with starch, which occurs in *Prunus serotina*, in small round grains. This gradually disappears, first from the parenchyma of the bast, and last from the medullary rays. By the last of November the bark is nearly, if not quite, free from starch, and remains so during the winter. During the last days of February, or early in March, a process of starch regeneration begins. In specimens collected March 21st the parenchyma cells of the bast contained a few scattered grains, and there was a little in those cells of the medullary rays which lay close to the wood. Specimens of April 6th showed an increase in all the cells of the bark, and April 21st, the maximum was nearly reached, for the bast parenchyma and medullary rays, as well as the green cells, contained

[1] *Jour. Pharmacology*, 4, 167.

[2] Dr. Alfred Fischer, *Physiologie der Holzgewächse Jahrbücher für Wiss. Bot.*, 1891, Sec. 73.

much starch. At this time the bud scales were open far enough to disclose the leaves, which were, however, still folded closely together.

Bark collected in May contained very little starch; in some samples none appeared to be present, and in others a very little could be made out by the use of dilute iodine, when the specimen was heated. Collections of August 5th exhibited no starch in the cells of the bark.

The seasons of maximum amounts of starch in the bark are, then, autumn and spring, and if the bark, whether powdered or whole, contains much starch in all the parenchymatous cells, we are sure the collection was made shortly after the time of leaf-fall in autumn or before the leaves unfolded in the spring. A test based upon the presence of starch cannot exclude the spring collection, and spring is the time when the bark is least valuable, so far as the amount of hydrocyanic acid which it may yield is concerned.

To distinguish between the collections of spring and autumn, I have found the following color test for tannin applicable to those samples of *Prunus serotina* which I have been able to obtain. The amount of tannin in barks collected in spring is noticeably greater than that found in the collections of the autumn. I hesitate to submit the following as an authentic test, because I have not made extended tests for amounts of tannin to be found in the bark of *Prunus serotina* throughout the year, and because the reasons for the periodicity in amount and the phases of its fluctuation in plants have not, so far as I am aware, been fully made out. It seems a matter of observation that when great activity of growth is going on, tannin appears in greater amounts than usual. This observation seems to receive support in the case of *Prunus serotina*, as a much greater amount of tannin seems present in the bark during the active growth of spring than in the autumn.

The following test shows this to be the case:

Upon the surface of distilled water in a watch-glass, sprinkle a little of the powdered drug, which will spread, forming a thin film. Let it stand ten seconds, and then drop into it one drop of a 1 per cent. solution of ferric chloride. If the bark was collected in the spring, a cloudiness will appear in the water from the greenish precipitate, which is immediately formed. If the bark was collected in autumn, there will be no noticeable precipitate under twenty seconds. Powders of Nos. 20 and 50 exhibit this test equally well.

Tests for hydrocyanic acid and emulsin, though successfully carried out upon bitter almonds as first tried by Guignard,[3] failed of results when tried with the barks of *Prunus serotina.*

WELLESLEY, MASS., May, 1897.

BURDOCK AS A VEGETABLE.[1]

BY INAZO NITOBE.

The well-known definition of a weed by Emerson as "a plant whose virtues have not yet been discovered," is confirmed by the better agricultural authority of Schwerz, according to whom "a weed is a plant of which the direct uses are unknown to man." Both the poet-philosopher and the scientific farmer implicitly admit, I think, that as man brings more and more of nature under his control—in other words, as he brings more and more plants under cultivation, many of them, hitherto scorned as weeds, must cease to be considered as such. I have often seen ridiculed the Chinese custom of eating birds' nests, bears' claws and other incomprehensible delicacies, but I cannot help admiring the power of pantophagy on the one hand and the refinement of culinary skill on the other, which can convert into means of human enjoyment things apparently worthless and revolting. If, as philosophers say, civilization consists mainly in bringing natural forces under man's subjection, China must be given a high place in the scale of civilization from a culinary point of view.

Is it not a real triumph of art to extract food for man from so coarse and ugly a weed as burdock? Most books on botany in the English tongue describe burdock, Lappa major or officinalis, as a pestiferous weed, and many an agricultural bulletin gives careful instruction how to destroy it. Perhaps the only use that has been made of Lappa in America is for medicine. The root contains a bitter principle, a resin and tannin, and it is said to have an aperient and diuretic effect. It also has some reputation as an alterative in constitutional blood diseases, and the readers of *Garden and Forest* may have used the so-called "burdock tea." In Germany, where the three species, L. major, L. minor, L. tomentosa, are widely

[3] *Guignard.* Sur. la localisation dans les plantes, des principes qui fournsisent l'acide cyanhydrique. *Comptes rendus,* 1890, p. 249.

[1] *Garden and Forest,* 10, 143.

spread, they were formerly much used as medicines under the name Radix Bardanæ, and they are even now regarded by some as good blood purifiers. Perhaps from the burr of the seeds the plant has the repute of power to stimulate a rich growth of hair, and an extract for this purpose is made from the roots. The peasants from the south of England use the roots as an antiscorbutic, and the leaves are employed in making a green elder ointment for the use of farriers.

All these medicinal uses are not to be despised, but they are unimportant when compared to the value of the plant as an edible vegetable; since the kitchen is more important than the drug store, the cook is nearer our hearts than the apothecary. Even in England the alimentary value of burdock was not always despised. Sowerby writes in his "Useful Plants of Great Britain:" "The stalks of the burdock, cut before the flowers open and stripped of their rind, form a delicate vegetable when boiled, similar in flavor to asparagus. In the raw state they may be eaten with oil and vinegar as salad. They were sometimes candied with sugar in the time of Bryant, as those of Angelica are. They are slightly laxative, but are perfectly wholesome. The roots of the plant are mildly diuretic and diaphoretic, and have been used with advantage in gout, rheumatism and calculous complaints. The decoction of the root is generally employed, but the seeds and leaves possess nearly the same properties, though the latter are slightly purgative. The bruised leaves are applied by the peasantry in some districts, in cataplasms to the feet, as a remedy for hysterical disorders."

In Japan, burdock grows wild in several places, but it is also extensively cultivated as a vegetable. Every one knows and eats "Gobo," the usual appellation for this plant, although a more refined and almost obsolete name is "kitakisu;" sometimes it is called "Uma (horse)-fuki (Nardosmia)." It is familiar to the Ainu under the name of "Seta (dog) koroki (Nardosmia)." Both the Ainu and the Japanese prefixes, "seta" and "uma," when applied to plants, seem to have much the same sense as the English "dog," in dogwood, dogbane, etc., and the "horse" in horse-radish, horse-chestnut, horse-mint, etc. The Ainu use it as food as well as medicine. They boil the tender shoots with beans, and the roots are put into soup. For medicinal uses the young leaves are softened by rolling them between the palms, and applied to skin eruptions. The Jap-

anese esteem Lappa for similar purposes. It is used in many preparations for its medicinal properties, which they believe—at least the old-fashioned empirics believe—consist in counteracting the action of some kinds of poisons. Grated and made into pulp, the roots are applied as a poultice in eruptions of the skin. But by far the more important use is made in the kitchen. As regards this plant we have outstripped the pantophagous Chinese, for they have not raised the plant to the dignity of a market vegetable. "When young," says a Chinese book on botany, "the tender leaves of the Lappa are cut and eaten as greens; the roots may be boiled or steamed and eaten, but people nowadays rarely use the plant." Among the Japanese, however, it has been under cultivation for years, and possibly for centuries. It enters the kitchen of every household, not being ostracised from the menu of the most high-toned restaurant. Thousands of acres are devoted to its culture. Official statistics for 1888 give the total production of Lappa in the country at about 72,000,000 pounds, valued at 422,134 yen. The roots average 350 grains in weight.

The production of so large a quantity is not at all to be wondered at when we recollect that Lappa ranks high in the scale of nutritive plants. In the amount of nitrogen it stands higher than potatoes, beets, carrots or turnips; in fact, few roots or tubers approach it. I append here its chemical composition, as compared with some other commonly used vegetables:

	H_2O	N	Ash	K_2O	Na_2O	CaO	MgO	P_2O_5	SO_3	SiO_2	Cl
Potatoes	75·0	3·4	9·5	5·8	0·3	0·3	0·5	1·6	0·6	0·2	0·3
Sugar Beets	81·5	1·6	7·1	3·8	0·6	0·4	0·6	0·9	0·3	0·2	0·3
Turnips	72·0	1·8	6·4	2·9	0·6	0·7	0·2	0·8	0·7	0·1	0·3
Carrots	85·0	2·2	8·2	3·0	1·7	0·9	0·4	1·1	0·5	0·2	0·4
Burdock	73·8	5·6	10·5	4·3	0·2	1·1	2·0	0·9	0·7	0·1	—

So important a crop as burdock has, of course, many varieties developed, but the best known among them are few in number. They are usually named from the localities where they were first developed or where they thrive best. A variety known as the Takinozawa, raised chiefly near Tokyo, has a slender root, about 4 feet long, and is of very fine quality. In the vegetable market of Tokyo it commands a respectable price. The Owura variety, named from a small

place in the province of Shimosa, where they produce only about 2,000 roots a year, attains the huge size of 1½ feet in circumference, and 2½ feet in length; this kind is sold at the rate of about 20 sen (a sen being a hundredth part of a Japanese dollar) apiece. In its form this variety is like the beet. The two kinds most popular in the markets of Kyoto are the Yamato and the Horikawa; in fact, these seem to be only different names of the same variety.

In raising Lappa much attention is naturally devoted to the right selection of the soil. It is a common belief among cultivators that that a light sandy soil is specially adapted to it, and it is true that roots grown from such soil are long and slender, but they are prone to be hollow at the centre and rather tough at the rind. A stronger and deeper soil, say clayey loam, seems to impart firmness to the root and a better flavor. To gain the most satisfactory results, the soil must be plowed deep and finely pulverized, or else an undue amount of labor will be required in harvesting the roots. Indeed, digging burdock is a proverbially hard task; it has become almost a fine art to do it well. Many an old writer recommends digging the soil to the depth of some 4 or 5 feet, and then putting in green leaves, stalks, turf, and so forth, in a layer a foot deep, and covering that with the earth that was excavated. The surface must then be well hoed in both directions. So much care, however, is only necessary when exceptionally fine specimens, for show or otherwise, are aimed at. One peculiarity of Lappa is that it is not adapted to rotation; that is; it thrives better if planted continuously on the same soil; in new land the roots are likely to become forked. It is also grateful for good manures—compost, night-soil, and especially to rice-bran—but if compost is applied it must be well decomposed, or else the roots will throw off too many branches.

When the soil is properly prepared seeds are planted in rows 3 feet apart, five or six seeds being placed every 6 to 8 inches in a row. In Owura, the usual time for sowing is the early part of May or late in April. Before the early part of June the young plants are thinned out, leaving but one in the hill. Very often liquid manure is applied two or three times before the roots are harvested late in December. Another method is to plant the seeds in August, so as to have the vegetable ready for spring use, in which case they are sown more closely, since they do not grow as vigorously as those planted in spring. Lappa is a slow grower, and takes over

220 days to mature. Seeds retain their vitality for five years, and many a gardener asserts that the best crop is obtained from those three years old. They say that new seeds produce roots which throw off too many branches and flower-stalks. This statement, however, is not always verified. For keeping and marketing, the vegetable may simply be left where it was grown, or kept buried in the earth like beets or turnips.

I am aware that a discourse on burdock will be of little interest to Americans unless it contains some information regarding the mode of using it, but it must be remembered that Japanese cuisine differs widely from the American. I need only state in general terms that, after their skin is scraped or peeled off, the roots may be sliced into long strips or cut into pieces of less than an inch in length, and boiled with soy, salt or Spanish pepper, to impart savor to them; or, if boiled alone, they may afterwards be browned in sesame oil, which of itself will flavor them. Another common way of cooking them is to scrape off the outer skin and cut them into pieces about 2 inches long, then, when they are boiled soft, to take them out of the pan and mash them; then make them into cakes much as you treat oyster-plants. A kind of salad, though not uncooked, is also made of them. A rather unique and more elegant process consists in stuffing the roots with sea-eel, and boiling them, after dipping them in a preparation containing soy and pepper. Slices of Lappa fried and eaten with some condiments form one of the commonest dishes with us. The roots are sometimes pickled in miso. There are many other ways of preparing this valuable vegetable for table use, but a longer description would be interesting or amusing only to the curious. Each country has its own taste and national cookery.

BRIMSTONE IN SICILY.[1]

Through the courtesy of Messrs. Ferd. Baller & Co., of this city, I am enabled to submit the following statistics of Sicily brimstone, which, at this time, when the Anglo-Sicilian sulphur trust is endeavoring to absorb the business, will be of special interest. The currency quoted is not the gold lire to be estimated at 5·18 to the dollar, but that of paper, the average value of which for the period covered was about 5·50 to the dollar.

[1] *Consular Report*, Vol. 54, page 202.

Exports from Girgenti, Licata, Catania, Termini and Palermo.

To—	July to December.			January to December.		
	1896.	1895.	1894.	1896.	1895.	1894.
	*Tons.**	*Tons.**	*Tons.**	*Tons.**	*Tons.**	*Tons.**
Great Britain	9 919	10,192	12,484	22,189	23,680	21,210
South of France	36.778	31,478	24.823	72,844	67,842	53.948
North of France	3,030	1,197	1,258	3.437	3.516	3,011
Holland	2,748	1,701	1,359	3.738	3 467	2,285
Belgium	3.724	3.425	2,913	7,605	6,567	5.743
Germany :						
Elbe	9.755	7,272	7,716	15,954	14.364	14.439
Baltic	132	244	350	1,986	1,623	3.363
Austria-Hungary	5,876	4,706	4.525	13,690	11,637	11,286
Russia	8,456	7.959	8,684	18.455	18,461	18,646
Sweden and Norway and Denmark	4,534	2,794	2,744	14,266	6,154	7,055
Spain		349	231	6,745	5,546	5,038
Portugal	24	1,459	1,200	11,996	14,556	8,491
Italy	12,894	12,351	9.485	54.435	55,723	54,533
Greece, Turkey, and Balkan States	187	736	522	18.869	16,444	17,302
Morocco, Tunis, Algiers, and Tripoli	245	236	1	826	368	168
South Africa	. . . .	. . . .	. . . .	1,430	. . . .	. . . .
United States and Canada (Atlantic)	63,129	61,551	58,321	123,476	99,586	106,665
United States (Pacific)	98	. . . .	. . . .	3.223	. . . .	. . . .
South America	727	1,041	369	1,833	2,095	469
Asia	487	922	135	1,033	1,524	576
Australia	120	108	32	1,281	2,639	1,150
Other countries	390	275	68	771	372	168
Total	163,253	149,996	137,220	400,082	356,164	335,548

*Tons of 13 Sicilian cantars.

Production, exports, stocks, and prices of Sicily brimstone.

Description.	1896.	1895.	1894.	1893.	1892.	1891.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Production,* official figures (in tons of 13 cantars)	. . . .	342,150	355,023	363.414	362,948	336.975
Exports†	400,082	356,164	335.548	347.304	309,912	293,620
Visible stocks at the end of December at—						
Girgenti	78,987	85,311	78,412	115,235	102,731	65 200
Licata	58,415	61,785	50,928	50,512	30,385	17,692
Catania	42,800	49,154	53,846	38,077	33,423	33,077
Termini‡	4,892	. . . .	. . . .	. . . .	. . . .	. .
Palermo	15.475	17.418	17,418	. . . .	. . . .	. . . .
Total	200,569	213,668	200,604	203,824	166,539	115,969
Prices at Girgenti on the 31st of December, per ton of 1,000 kilograms, first cost :‖	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*
Best unmixed seconds	89.90	55.00	61.60	75.50	81.00	125.00
Best thirds	88.90	52.20	55.00	65.60	75.50	118 90

*Quantities carried by rail from the stations in the interior to the ports, 303 830 tons of 13 cantars, during the financial year July to June, 1895-96, against 287,840 tons in 1894-95.

† In the exports for the years 1891, 1892 and 1893, those from Termini and Palermo are not included, which, during 1894 to 1896, amounted to 6,000 to 13,000 tons per annum. To calculate the total consumption, 10,000 tons have to be added, representing the estimated yearly consumption in Sicily.

‡ Stocks at Termini for the years preceding 1896 are wanting, but were probably smaller.

‖ Since the 1st of October, 1896, the export duty of 11 lire per 1,000 kilograms was abolished.

After a careful study of the above figures, I think the readers of this report will recognize the truth of the following deductions:

(1) The exports of sulphur from Sicily in 1896 were 44,000 tons in excess of 1895, of which 31,000 tons were exported from January to July. This increase is to be attributed to the exceedingly low prices which prevailed toward the close of 1895 and the beginning of 1896, at which figures the working of a majority of the mines was unprofitable. The increase of 13,000 tons in the last six months of 1896 is undoubtedly due to the sudden advance in prices, which induced consumers to lay in heavy stocks in anticipation of a further rise. These stocks, however, cost them relatively low prices.

(2) By reference to the table of exports, stocks and prices for 1891–1896, it will be observed that, although prices steadily declined during those years, the production, as estimated by the mining bureau, frequently increased and never decreased. Stocks show a constant increase. These facts unquestionably prove that the cost of production has diminished, cheaper transportation has been gained by the construction of roads and railways, and improvements have been made in mining and smelting. It follows, therefore, that production at the lower prices has continued steadily, because it was found profitable.

(3) The increase of exports during these years is natural, because the large production had to be sold, and this was made possible by the fall in prices.

(4) The Italian Parliament abolished the export duty of 8*s.* 6*d.* ($2.06) per ton with the object of favoring exports, since this duty increased the cost to the foreign consumer. The artificial advance which the Anglo-Sicilian sulphur trust wishes to establish is, therefore, in opposition to all the above facts, although the latter are responsible both for the decline in price for several years and the abolition of the export duty.

(5) It is stated that the production in 1896 shows an increase, and although the statistics are not yet published, there is the best authority for estimating it at about 385,000 tons. That there really was an increase is confirmed by the following facts: There were shipped, in 1896, 44,000 tons more than in 1895, but nevertheless the visible stock in the ports of Sicily on the 31st of December, 1896, was only 18,000 tons less than on the same date in 1895. The difference of 26,000 tons must, therefore, come from an increase of pro-

duction, which, in part at least, belongs to 1896, as some of this quantity may be sulphur stored in the mines in 1895, and not shipped promptly. Further, the quantity carried by rail from the stations in the interior to the ports was larger in the fiscal year 1895–96 than in 1894–95.

(6) Everything points to an increased production for 1897, and if the present prices check the consumption, stocks must necessarily increase during the year.

(7) Should Sicilian brimstone be partly replaced in the United States by pyrites for the manufacture of sulphuric acid, this will diminish our imports, which have been from 100,000 to 125,000 tons per annum, or 25 to 30 per cent. of the total production of Sicily.

(8) For the above reasons, it seems more than doubtful that the Anglo-Sicilian sulphur trust can succeed in maintaining the prices at the present artificial point for any length of time. Its capital is £750,000 ($3,649,885) and it has purchased its brimstone at about 65*s.* ($15.80) per ton free on board Sicily, plus all the other expenses.

CHAS. M. CAUGHY,
Consul.

MESSINA, March 29, 1897.

STUDY OF THE AMERICAN MEDICINAL FLORA.

The Sub-Commission of the Pan-American Medical Congress, appointed to study the medicinal plants of the United States, has entered into an association with the Smithsonian Institution for that purpose. The attention of our readers is called to the respective circulars issued by these organizations, which we print below:

SMITHSONIAN INSTITUTION, WASHINGTON, D. C.,
May 28, 1897.

DEAR SIR:—The Smithsonian Institution has undertaken to bring together all possible material bearing on the medicinal uses of plants in the United States. Arrangements have been made with a body representing the Pan-American Medical Congress, the Sub-Commission on Medicinal Flora of the United States, to elaborate a report on this subject, and the material when received will be turned over to them for investigation.

The accompanying detailed instructions relative to specimens and notes have been prepared by the Sub-Commission.

All packages and correspondence should be addressed to the Smithsonian Institution, Washington, D. C., and marked on the outside *Medicinal Plants, for the U. S. National Museum.*

Franks which will carry specimens, when of suitable size, together with descriptions and notes, free of postage through the mails, will be forwarded upon application. Should an object be too large for transmission by mail the sender is requested, before shipping it, to notify the Institution, in order that a proper authorization for its shipment may be made out.

Respectfully,

(Signed) S. P. LANGLEY, *Secretary.*

INSTRUCTIONS RELATIVE TO MEDICINAL PLANTS.

The Pan-American Medical Congress, at its meeting held in the City of Mexico, in November, 1896, took steps to institute a systematic study of the American medicinal flora, through the medium of a General Commission and of special Sub-Commissions, the latter to be organized in the several countries. The Sub-Commission for the United States has been formed, and consists of Dr. Valery Havard, U. S. A., Chairman; Mr. Frederick V. Coville, Botanist of the U. S. Department of Agriculture; Dr. C. F. Millspaugh, Curator of the Botanical Department of the Field Columbian Museum, Chicago; Dr. Charles Mohr, State Botanist of Alabama; Dr. W. P. Wilson, Director of the Philadelphia Commercial Museums; and Prof. H. H. Rusby, of the New York College of Pharmacy. This Sub-Commission solicits information concerning the medicinal plants of the United States from every one in a position to accord it. The principal points of study are as follows:

(1) Local names.

(2) Local uses, together with historical facts.

(3) Geographical distribution and degree of abundance in the wild state.

(4) Is the plant collected for market, and if so—

(*a*) At what season of the year?

(*b*) To how great an extent?

(*c*) How prepared for market?

(*d*) What is the effect of such collection upon the wild supply?

(*e*) What price does it bring?

(*f*) Is the industry profitable?

(5) Is the plant, or has it ever been, cultivated, and if so, give all information on the subject, particularly as to whether such supplies are of superior quality, and whether the industry has proved profitable?

(6) If not cultivated, present facts concerning the life history of the plant which might aid in determining methods of cultivation.

(7) Is the drug subjected to substitution or adulteration, and if so, give information as to the plants used for this purpose?

While it is not expected that many persons will be able to contribute information on all these points concerning any plant, it is hoped that a large number of persons will be willing to communicate such partial knowledge as they possess.

It is not the important or standard drugs alone concerning which information is sought. The Sub-Commission desires to compile a complete list of the plants which have been used medicinally, however trivial such use may be. It also desires to collect all obtainable information, historical, scientific and economic, concerning our native and naturalized plants of this class, and, to that end, invites the co-operation of all persons interested. Poisonous plants of all kinds come within the scope of our inquiry, whether producing dangerous symptoms in man, or simply skin inflammation, or, as "loco-weeds," deleterious to horses, cattle and sheep. In this respect the general reputation of a plant is not so much desired as the particulars of cases of poisoning actually seen, or heard from reliable observers. It is believed that much interesting knowledge can be obtained from Indians, Mexicans and half-breeds, and that, consequently, Indian agencies and reservations are particularly favorable fields for our investigation. Such knowledge will be most acceptable when based upon known facts or experiments.

In order to assist in the study of the habits, properties and uses of medicinal plants, the Sub-Commission undertakes to furnish the name of any plant specimen received, together with any desired information available.

Owing to the diversity in the common names of many plants, it will be necessary for reports, when not furnished by botanists or others qualified to state the botanical names with certainty, to accompany the same with some specimen of the plant sufficient for its identification. While the Sub-Commission will endeavor to determine the plant from any portion of it which may be sent, it should be appreciated that the labor of identification is very greatly decreased, and its usefulness increased, by the possession of complete material, that is, leaf, flower and fruit, and in the case of small plants, the underground portion also. It is best to dry such specimens thoroughly, in a flat condition under pressure, before mailing. While any convenient means for accomplishing this result may be

employed, the following procedure is recommended: Select a flowering or fruiting branch, as the case may be, which, when pressed, shall not exceed 16 inches in length by 10 inches in width. If the plant be an herb 2 or 3 feet high, it may be doubled to bring it within these measurements. If it possess root leaves, some of these should be included. Lay the specimen flat in a fold of newspaper and place this in a pile of newspapers, carpet felting, or some other form of paper which readily absorbs moisture, and place the pile in a dry place under a pressure of about 20 to 30 pounds, sufficient to keep the leaves from wrinkling as they dry. If a number of specimens are pressed at the same time, each is to be separated from the others by three or four folded newspapers or an equivalent in other kinds of paper. In twelve to twenty-four hours these papers will be found saturated with the absorbed moisture, and the fold containing the specimens should be transferred to dry ones. This change should be repeated for from two to five days, according to the state of the weather, the place where the drying is done, the fleshiness of the specimens, etc. The best way to secure the required pressure is by means of a pair of strong straps, though weights will do. The best place for drying is beside a hot kitchen range. When dry the specimens should be mailed between cardboards or some other light but stiff materials which will not bend in transit.

It is a most important matter that the name and address of the sender should be attached to the package and that the specimens, if more than one, should be numbered, the sender retaining also specimens bearing the same number, to facilitate any correspondence which may follow. The Sub-Commission requests that, so far as practicable, all plants sent be represented by at least four specimens.

(Signed) H. H. RUSBY, M.D.,
Chairman of the General Commission,
New York College of Pharmacy.

VALERY HAVARD, M.D.,
Chairman of the Sub-Commission,
Fort Slocum, Davids Island, New York.

The death of Prof. Dr. *Pieter Cornelio Plugge*, of Gröningen, Netherlands, has been announced. He held the chair of Pharmacy and Toxicology in the University of his native town. His death occurred June 30, at the Royal Botanical Gardens, Buitenzorg, Java, whither he had been sent by the Dutch Government on a scientific mission.

EDITORIAL.

NOTABLE PHARMACEUTICAL GATHERINGS DURING AUGUST.

The month of August, this year, will witness the assembling of a larger number of pharmacists in various parts of the world than is usual during so short a time.

Early in the month will be the British Pharmaceutical Conference at Glasgow, Scotland. This body is noted for the large amount of scientific work it can accomplish in a short time. The Eighth International Pharmaceutical Congress will follow, at Brussels, Belgium, on the 14th. The scope of this assembly was sufficiently set forth in the March number of this JOURNAL, page 161. The American Pharmaceutical Association has appointed the following delegates: Prof. Joseph P. Remington, of Philadelphia, and Mr. Louis Dohme, of Baltimore, with Dr. Frederick B. Power, of London, and Mr. Adolph Meyer, of New Orleans, as alternates.

Of the associations not strictly pharmaceutical, we will have the meeting of the American Association for the Advancement of Science, at Detroit, on the 9th; that of the American Chemical Society at the same place during the same week; and on the 19th the Twelfth International Medical Congress, at Moscow, Russia. This last has issued a formidable programme of 71 pages, in the French language, and containing some hundreds of titles of papers to be presented from physicians and others, from all over the world. If 1 per cent. of the promises should be redeemed, it would still scarcely be possible to have them all read during the eight days that the fifteen sections of the Congress will be in session. In addition to the papers, ten addresses have been promised; these are to be delivered before the general assembly.

Returning to the strictly pharmaceutical meetings, we will have that of the American Pharmaceutical Association at Lake Minnetonka, Minn., from the 24th to the 31st, inclusive. The following programme has been adopted by the Council:

TUESDAY, August 24th.

Council Meeting	11.00 A.M.
First General Session	2.30 P.M.
Meeting of the Nominating Committee	6.00 P.M.
Reception and Promenade Concert	8.30 P.M.

WEDNESDAY, August 25th.

Second General Session	10.00 A.M.
Commercial Section	2.30 P.M.
Travellers' Entertainment	8.30 P.M.

THURSDAY, August 26th.

Scientific Section	10.00 A.M.
" "	2.30 P.M.
" "	8.30 P.M.

FRIDAY, August 27th.

Section on Pharmaceutical Education and Legislation	10.00 A.M.
" " " "	2.30 P.M.
" " " "	8.30 P.M.

SATURDAY, August 28th.

Third General Session (Final Business) . . . . . 10.00 A.M.
Boat Ride . . . . . (" Session) . . . . . 4.00 P.M.
Lectures by President Northrup and Prof. F. J. Wulling, of the University of Minnesota . . . . . 8.00 P.M.

SUNDAY, August 29th.

Devoted to rest.

MONDAY, August 30th.

Trip to Taylor Falls and Dells of St. Croix.

TUESDAY, August 31st.

Trip by cars and carriages through the Twin Cities (Minneapolis and St. Paul).

EVENING, BANQUET.

The arrangements about transportation have not yet been completed. It is understood, however, that a one-fare rate has been secured from Chicago and St. Louis. Members desiring to start from either of those cities should address Mr. A. E. Ebert, of Chicago, or Prof. H. M. Whelpley, of St. Louis. Professor Caspari, of Baltimore, is arranging for a lake trip of three lays from Buffalo to Duluth; those desiring to go by water should address him.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

AN ILLUSTRATED FLORA OF THE NORTHERN UNITED STATES, CANADA AND THE BRITISH POSSESSIONS, from Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean Westward to the One Hundred and Second Meridian. By Nathaniel Lord Britton, Ph.D., and Hon. Addison Brown. In three volumes. Vol. II. Portulacaceæ to Menyanthaceæ, Portulaca to Buckbean. New York. Charles Scribner's Sons. 1897.

The first volume of this illustrated flora was reviewed in the AMERICAN JOURNAL OF PHARMACY, November, 1896, p. 630, the second volume containing the work in the sequence of the *Naturliche Pflanzenfamilien*, by Engler and Prantl, to the buckbean family, has now been issued. The publishers are to be congratulated upon the prompt publication of a work requiring so much original labor of authors, artist, engraver and printer. This volume contains 647 pages, and the binding, typography, illustrations, descriptions, bibliographical references and the other excellent features of the preceding volume have been fully maintained.

The second volume contains figures of 1,467 species. In most instances these are good representations, but in a few we are disappointed. The magnitude of the author's undertaking is such that the students of our flora will willingly overlook these minor defects.

As was to have been expected, the adherence to the Rochester rules of nomenclature has presented us with a number of new binomials for our old friends, as, for example, our common apple becomes Malus malus (L.), Britton and American Wistaria (the erroneous spelling *Wisterea* is persisted in), becomes Kraunhia frutescens (L.) Greene. The rigid enforcement of the law of priority is illustrated on page 358, where Polygala viridescens L. replaces the familiar P. sanguinea L., both having been used by Linnæus, on page 705,

Species Plantarum, 1753. It is our intent to more carefully note the changes necessitated in the names of medicinal plants, upon the completion of Volume III.

A cursory examination of the volume exhibits great freedom from typographical errors and comparatively little for criticism. On page 345 we are informed that Oxalis acetosella "yields the druggists' salt of lemon." The modern methods of manufacturing the oxalates have displaced such a primitive source.

The distribution of plants is generally accurately given. The existence of Ilicioides mucronata (L.) Britton, (Nemopanthes fascicularis, Raf.), in New Jersey, has, however, escaped attention.

The authors have aimed to incorporate the most recent contributions and studies of the different genera and orders. Consequently some very recently described plants are figured here. Of these may be mentioned as examples Potentilla littoralis, Rydberg, 1896; Cratægus Vailiæ, Britton, 1896; Prunus Gravesii, Small, 1897; Viola atlantica, Britton, 1897. The treatment of many groups show critical study on the part of the authors. Several entirely new species are described, and a very general tendency through the volume is to elevate well-marked varieties of previous authors to specific rank, and a number of species discarded in Gray's Manual have been revived.

Another commendable feature of the work is the introduction of many foreign plants that have escaped from cultivation, or otherwise become distributed in waste places. This renders the book especially valuable to the botanists in our seaport cities, who collect on the ballast grounds.

It is an up-to-date book, and a most valuable contribution to the literature of systematic botany, and we eagerly await the appearance of the final volume.

G. M. B.

DIE NEUEN ARZNEIDROGEN AUS DEM PFLANZENREICHE. Von Dr. Carl Hartwich, Professor der Pharmakognosie am Eidgenössichen Polytechnikum in Zürich. Verlag von Julius Springer, Berlin, 1897. Preis, M. 12.

During the past several years, the additions to the list of medicinal drugs from the vegetable kingdom has been so rapid that in self-protection one is driven to devise some kind of a system by which to keep track of them. The author prepared for his own use an alphabetical list of such new drugs, with a brief statement concerning each of them, and a number of references to the literature of the subject. The result was so satisfactory that he decided to elaborate the same and publish it. We have, in consequence, a book of some 469 pages, filled with matter which is not only compactly printed, but, what is more important, compactly stated. Any one interested in new plant drugs, if he has only a moderate familiarity with the German language, will find this book of the greatest value.

An introduction of twenty-three pages gives a general view of the subject, and points out the rapidity and extent to which new plant drugs have been recognized by the various pharmacopœias. Following this is the special part which constitutes the great bulk of the work, and which consists of short notices of new plant drugs, arranged in alphabetical order. The names and synonyms of each are given, then follow short descriptions, habitat, uses, chemical composition, etc., not always in the same order; the latter feature has

some advantages, since it renders this part more readable, and does away with what would tend towards a tabular presentation of the subject. A few lines of references are finally added, and enough is before one concerning a drug to enable him to have an intelligent idea about it, or to prosecute his studies further elsewhere.

An appendix of some 30 pages follows the special part, and includes some of the very newest drugs. This is followed by a literary index of books and journals used in the references. The author was somewhat in doubt about arranging the subjects in alphabetical order, but he had found it best for his own use, so he allowed it to stand; but in order to make the work more complete he added an index of the plants, arranged according to the natural system. Finally, there is a very complete general index.

There is no doubt but this work will facilitate the study of plant drugs, and aid in bringing some of them more prominently before the two professions of pharmacy and medicine.

ON THE PRESENCE OF A TRUE MANNA ON A "BLUE GRASS," ANDROPOGON ANNULATUS. By R. T. Baker, F.L.S., and Henry G. Smith, F.C.S. Reprint of paper read before the Royal Society of New South Wales, December 2, 1896.

In addition to identifying this substance as a true manna, the authors have made quite a study of it from botanical, chemical and economic standpoints. The paper is illustrated by two full-page plates, and a bibliography of the literature of eucalyptus manna and lerp has been appended.

REPORT OF THE COMMITTEE APPOINTED BY THE NATIONAL ACADEMY OF SCIENCES UPON THE INAUGURATION OF A FOREST POLICY FOR THE FORESTED LANDS OF THE UNITED STATES, TO THE SECRETARY OF THE INTERIOR. Washington. Government Printing Office, 1897.

This report is the result of the appointment of a committee by the president of the National Academy of Sciences, on the request of the Secretary of the Interior. The report is an exhaustive one, and after discussing the whole subject of forestry in the United States, the results are condensed into conclusions and recommendations that are easily comprehended. A number of bills are offered for presentation to Congress to enable the recommendations to be carried out. The committee is composed of the following well-known experts: Charles S. Sargent, Henry L. Abbott, A. Agassiz, Wm. H. Brewer, Arnold Hague, Gifford Pinchot, Wolcott Gibbs.

UEBER ISOMERE MENTHYLAMINE UND MENTHENE. By D. T. Werner. Inaugural Dissertation. Göttingen, 1897.

This is the result of a careful study of the properties of dextro- and lævo-rotary menthylamine.

THE NATIONAL CONFECTIONERS' ASSOCIATION OF THE UNITED STATES. 1897. This Association has done a good work in compiling, in a neat volume of 186 pages, all the "pure food and pure candy laws" in force in the United States, April 1, 1897. There is great lack of uniformity among the different States; many have no food or candy laws, others have both, and a number hold that candy is a food, and therefore apply the provisions of the pure food law to it.

REPORT OF THE FIFTEENTH ANNUAL PROCEEDINGS OF THE LOUISIANA STATE PHARMACEUTICAL ASSOCIATION, held at New Orleans, May 11 to 13, 1897.

Two original communications were received and read at this meeting, viz.: "Does a College of Pharmacy Education Possess any Advantages over that Gained by Long Practical Experience?" by Dr. T. A. Quayle; and "How to Increase our Membership," by Leon Barthet. A number of interesting reports were also presented. The Association is doing a good work by endeavoring to introduce the *National Formulary*, and thereby have physicians prescribe the preparations contained in it.

MINUTES OF THE COLLEGE MEETING.

The quarterly meeting of the College was held June 28, 1897, with President Bullock in the chair. The minutes of the Boaru of Trustees for April, May and June were read and adopted.

A communication from Chairman Beale, of the Section on Pharmaceutical Education and Legislation, of the American Pharmaceutical Association, was presented. It consisted of a list of interrogatories bearing upon the construction of a uniform pharmacy law for all the States. This document was deemed altogether too voluminous and comprehensive to be properly considered in the limited time at the disposal of the College, and action upon it was postponed.

Mr. E. M. Boring offered a resolution, which appeared to involve a modification of the charter, and the spirit of which resolved itself into two queries, which the Secretary was directed to submit to the College Counsellors for an opinion. These queries were as follows:

"Can the College restrict the eligibility of members to serve in the Board of Trustees to such only as do not receive emoluments for service rendered the College?"

"Should the Board of Trustees deem it desirable to elect one or more of the faculty associate members of the Board without voice unless requested, and also without vote, can it do so?"

The chairman appointed the following delegates to the meeting of the American Pharmaceutical Association: Samuel P. Sadtler, F. W. E. Stedem, Josiah C. Peacock.

WILLIAM B. THOMPSON, *Secretary.*

OBITUARY.

Prof. Dr. Karl Remigius Fresenius.—On the 11th of June Professor Fresenius, the noted chemist, died at Wiesbaden, Germany, in the seventy-ninth year of his age, of heart disease.

He was born at Frankfort-on-the-Main, December 28, 1818, and obtained his education for the most part in the schools of that city. In 1836 he was apprenticed as an apothecary, and while pursuing this vocation attended lectures on chemistry and physics. Later he became a student at the University of Bonn, and, in 1841, went to Giessen as assistant in Liebig's laboratory. In 1843 he accepted a position as private instructor in chemistry at the University of Giessen, where, however, he remained only two years, when he was called to the Agricultural Institute of Wiesbaden as professor of the natural sciences.

Here, in 1848, he established his famous private laboratory, to which was added, in 1862, a pharmaceutical department.

As is well known, Professor Fresenius devoted his attention chiefly to the subject of Analytical Chemistry, and his "Anleitung zur qualitative chemischen Analyse" and "Anleitung zur quantitative chemischen Analyse" have gone through a number of editions, and have been translated into almost every living tongue. In addition to his other literary labors, he was editor of the *Zeitschrift für analytische Chemie* since 1862.

In recognition of his services as a scientist, numerous honorary titles and orders of distinction were bestowed upon Professor Fresenius by various societies and scientific bodies, both in Germany and in other countries, and in 1893 he was elected an honorary member of the Philadelphia College of Pharmacy.

Prof. Julius von Sachs.—On the 29th of May Professor von Sachs, the famous botanist, died at Würzburg, Germany, where he had resided since 1868. He was born at Breslau, in 1832, and his life was enriched by labors which have had a distinct and decided influence on the advances made in recent years in scientific botany, particularly plant physiology and the principles of causality as applied to plant life.

Professor Sachs was a voluminous writer, and of his works the following may be mentioned: "Botanical Experimental Physiology," "Text Book of Botany," "History of Botany" (from 1600 to 1860), and "Lectures on Plant Physiology." He was not only distinguished as an author, but was an accomplished lecturer, and had devoted the greater part of his life to teaching. For twenty-nine years he had been Professor of Botany at Würzburg, and for a time during the early part of his scientific career was assistant to Purkinje at Prague.

NOTES AND NEWS.

Professor J. B. Nagelvoort has resigned the chair of Pharmaceutical Chemistry in the School of Pharmacy, Northwestern University, and is at present in Amsterdam, Netherlands. Some of his contributions on pharmacy in the United States have recently appeared in the *Pharmaceutisch Weekblad* of Rotterdam.

The *Hanbury Medal* has been awarded for this year to Dr. John E. De Vrij, of The Hague. He was born in Rotterdam in 1813. The President of the British Pharmaceutical Society, in announcing the award, said: "It was interesting to note that in this year of the Diamond Jubilee the award was made to a gentleman who, although not an Englishman, had an order conferred by Her Majesty, he being a Companion of the Order of the Indian Empire, that distinction having been given him for work done in connection with cinchona cultivation in India. It was also interesting to remark that the first paper published by Dr. De Vrij was written about four years before Her Majesty came to the throne. Since that time he had been an indefatigable worker in original research connected with the chemistry and natural history of drugs, partly in connection with cinchona. He began life as a pharmacist, and had been connected with pharmacy ever since."